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Review Article

Managing Placenta Accreta Spectrum: Emerging Strategies and Unresolved Challenges

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Abstract

Placenta accreta spectrum can turn a planned birth into a major haemorrhagic emergency, with consequences that extend well beyond delivery. This critical narrative review examines emerging approaches to diagnosis, treatment and service organisation, drawing on contemporary guidance and selected primary studies. Expert ultrasound remains central to assessment. Artificial intelligence and molecular studies offer new possibilities, but neither has yet established a dependable basis for routine treatment decisions. Evidence for uterus-preserving surgery is growing, although small trials, selected cohorts and limited long-term follow-up leave important questions unanswered. Vascular and urological adjuncts require similarly careful selection. The review also considers sociocultural concerns about hysterectomy, especially in Middle Eastern care, and the ethical limits of attempts to preserve the uterus. We propose a framework that brings diagnostic confidence, surgical complexity, the woman's priorities and service capability into the same clinical discussion. We also examine Accreta Spectrum Centres, drawing lessons from specialist endometriosis services while recognising the additional demands of obstetric emergencies. Such centres need reliable staffing, transfusion and critical care, together with funded responsibilities to referring hospitals. Their financial value depends on local costs, case volume and the consequences for families. Geography is a denominator of care: performance should be assessed across the whole catchment population, including women who never reach a specialist centre. The priorities are better comparative evidence, accountable referral networks and follow-up that measures physical and psychological recovery. Technical advances will improve care only when women can reach services equipped to use them safely.

Keywords: *Placenta Accreta Spectrum; Obstetric Haemorrhage; Precision Surgery; Uterine Preservation; Artificial Intelligence; Maternal Health; Clinical Governance*

Introduction

A woman with placenta accreta spectrum (PAS) may remain well throughout pregnancy and still face severe haemorrhage at delivery. Abnormal placental attachment and changes in the surrounding uterus and pelvic vessels can make separation dangerous. Care therefore begins with recognising risk, interpreting the anatomy and preparing a team able to respond if the clinical situation changes. The ACOG-SMFM consensus places antenatal recognition, avoidance of placental disruption and specialist multidisciplinary care at the centre of management [1]. Contemporary RCOG guidance also emphasises early assessment and individualised planning [2].

Survival is the first priority. Yet a woman may leave hospital with urinary symptoms, prolonged disability, distress after intensive care or grief following an unexpected hysterectomy. Retaining the uterus also carries possible burdens, including repeated emergency admissions and uncertainty about another pregnancy. These consequences belong in the discussion of treatment, not only in the review of complications afterwards.

This review asks how advances in imaging, surgery and biological understanding can improve that experience. It also considers the services needed to make treatment safe and accessible. A new technique has limited value if the women most likely to need it cannot reach an experienced team. Organisation, affordability and geography are therefore part of the clinical question.

Scope and approach

This critical narrative review considers current evidence and its implications for future care. Targeted web searches of PubMed-indexed literature, journal publications and professional guidance addressed PAS risk, imaging, surgical treatment, perioperative adjuncts, molecular research, recovery, specialist centre organisation, geographic access and economic evaluation. Priority was given to current guidance, prospective cohorts and randomised studies; selected retrospective studies were included where they directly addressed unresolved clinical questions. Reference details were checked against publication or indexing records.

The search was targeted rather than systematic. No formal risk-of-bias assessment or meta-analysis was undertaken. Published findings are distinguished from our interpretation and service proposals, which require evaluation. The article reports no original patient-level research.

Prevention begins before the affected pregnancy

The association between repeated caesarean birth and subsequent morbidity is established. In a prospective cohort of 30,132 caesarean deliveries without labour, Silver and colleagues found increasing risks of PAS and other major complications as the number of caesareans rose [3]. These findings support counselling that considers a woman's likely reproductive course, while recognising that the safety of the current pregnancy may require operative delivery. Prevention should never become pressure to accept an unsafe mode of birth.

A history of uterine surgery alone gives an incomplete picture of risk. The prospective population-based PACCRETA analysis included 396 women with a previous caesarean and a low-lying placenta or placenta praevia; 108 had PAS. Risk varied from 5% with one previous caesarean and a posterior low-lying placenta to 63% with at least three previous caesareans and placenta praevia [4]. These figures apply to a selected high-risk population, not to all pregnant women. Scar history and precise placental location should therefore be assessed together.

Prevention requires continuity between successive pregnancies. The indication and operative findings at caesarean birth should be documented in a form accessible during the next pregnancy. Women should receive comprehensible information about future placental risk without implying that complications are inevitable. Services could then use that information to trigger appropriate imaging rather than relying on a woman to reconstruct an old surgical history.

Research into scar healing may help, but an improved appearance of the scar on imaging does not demonstrate a reduction in PAS. A closure technique or interpregnancy repair would need prospective evidence on subsequent implantation, fertility and pregnancy safety before being promoted for this purpose. The appropriate immediate response is better reproductive counselling and avoidance of unnecessary uterine intervention, alongside timely access to clinically indicated surgery.

Understanding the lesion before choosing the operation

The familiar terms accreta, increta and percreta remain useful, but a single depth label provides an incomplete account of operative difficulty. The FIGO clinical classification sought to improve consistency in recognising and describing PAS [5]. Antenatal imaging, operative

descriptions and pathology need to be reported consistently. A deeply remodelled anterior lower segment with extensive vessels presents different practical problems from a limited attachment elsewhere, even when both receive a similar categorical diagnosis.

Biological research is also challenging an exclusively trophoblast-centred explanation. Afshar and colleagues used single-cell approaches to examine abnormalities involving decidual and endothelial boundaries [6]. Ji and colleagues combined single-cell and spatial transcriptomic methods to explore trophoblast changes and the local myometrial immune environment [7]. Together, these studies encourage investigation of the placental bed as a disordered maternal-fetal interface. They do not establish that a molecular signature can predict surgical severity or that modifying it will reverse established disease.

Clinical planning requires separate judgements about the likelihood of PAS and the difficulty of surgery. A team may be highly confident that PAS is present while remaining uncertain about the feasibility of reconstruction. Alternatively, imaging may be equivocal despite anatomy that would make emergency surgery hazardous. These uncertainties should be documented separately. Otherwise, a seemingly precise imaging grade may become an unjustified commitment to a particular operation.

Anatomical reporting should describe the location and extent of abnormal attachment, uterine remodelling, relationship to the bladder and cervix, and suspected lateral involvement. The report should also state which observations are uncertain. Reporting these features alongside established classifications would make multidisciplinary discussion and comparisons between studies more informative.

Imaging that changes care

Ultrasound will remain central because it can combine placental localisation, assessment of the uterine interface and vascular interrogation in a repeatable examination. The SMFM Ultrasound Marker Task Force addressed inconsistent terminology and examination methods [8]. Standardisation matters particularly when images move between referring units and specialist centres. A report of increased vascularity is difficult to interpret without knowing where it was seen and how it was assessed.

NICE recommends expert greyscale and colour Doppler assessment around 28 weeks, no later than 29 weeks, when the routine scan identifies a low-lying placenta or praevia in someone with a previous uterine scar [9]. Concern arising earlier in pregnancy should prompt review at that stage. Services need to ensure that recognised risk leads to appropriate imaging and a recorded decision about further care.

Magnetic resonance imaging should answer a defined unresolved question. In a retrospective study, Einerson and colleagues found that MRI could alter an ultrasound-based diagnosis but that changes were often incorrect [10]. MRI may help answer selected anatomical questions, but an additional scan does not necessarily make the diagnosis more reliable. Its value depends on the question and the expertise available.

Imaging research should assess how results affect clinical decisions. Relevant outcomes include appropriate referral, avoidable transfers, revised operative plans, unsuspected complex disease and unnecessary escalation. Diagnostic accuracy alone cannot show whether an imaging pathway improves care. A test may perform well in a referral cohort yet generate excessive false positives when applied to a lower-risk population.

Image archiving should become part of routine quality assurance. Reviewing antenatal images alongside operative findings can identify recurring discrepancies and improve local expertise. This requires protected time and agreed terminology rather than simply purchasing additional equipment. Shared review between hospitals may offer a practical route to improving consistency while keeping responsibility for the final decision clear.

Artificial intelligence with accountable implementation

Artificial intelligence may eventually support image acquisition, highlight an abnormal interface or combine imaging features with clinical risk. A recent single-centre retrospective study by Hammerquist and colleagues analysed ultrasound material from 113 at-risk patients. Its test cohort contained only 17 patients, with a reported area under the receiver operating characteristic curve of 0.972 [11]. This is encouraging exploratory evidence; the small test set cannot establish dependable performance across different services.

The number of women studied matters more than the number of image frames. Thousands of frames from a small group of patients remain a small clinical sample. All images from a given patient must remain within the same training, validation or test group. External testing should also examine different ultrasound machines, acquisition practices and patient populations. A model that recognises local image characteristics rather than disease could otherwise appear deceptively accurate.

Before clinical adoption, a model should undergo prospective evaluation without influencing care, followed by an impact study if performance is adequate. Evaluation should include calibration, false-negative cases, referral burden and the consequences of clinician disagreement. Thresholds suitable for a screening service may be unsuitable for decisions carrying a risk of hysterectomy.

Any clinical use should support decisions and allow clinicians to review or challenge the result. A low model score should not prevent specialist assessment when clinical concern remains. Equally, an elevated score should not acquire the authority of a pathological diagnosis. Responsibility for interpreting uncertainty must remain with the clinical service, supported by audit of model performance after deployment.

The specialist service as a therapeutic intervention

The organisation of care can influence clinical outcomes. Eller and colleagues compared PAS managed by a multidisciplinary team with standard obstetric care in a retrospective cohort of 141 cases. Specialist team care was associated with less large-volume transfusion and fewer early reoperations [12]. The study cannot separate the contributions of expertise, referral patterns and hospital resources. It nevertheless suggests that how care is organised can affect outcomes.

A functioning PAS service should have a named clinical lead, coordinated imaging review, an agreed operative plan, blood-bank preparation and an emergency alternative. Responsibility for contacting each specialty should be assigned rather than presumed. Multidisciplinary care requires preparation before the woman reaches theatre.

Centralisation also creates obligations to referring hospitals. A specialist centre should provide clear referral criteria, timely advice and a plan for deterioration before transfer. Shared electronic access can help, but it cannot compensate for an unanswered referral or an unavailable bed. Network performance should therefore be measured across the entire pathway, including women who never reach the designated centre.

For lower-resource settings, a staged model is more realistic than insisting that every hospital reproduce a highly equipped unit. Initial priorities are recognition, communication, blood availability, safe anaesthesia and access to experienced surgery. Teleconsultation and shared image review may extend specialist advice, provided transfer and emergency decisions remain grounded in local capability. The purpose of technology should be to resolve a specific obstacle to care.

Timing birth through explicit risk assessment

Timing remains an area where recommendations differ. ACOG-SMFM describes planned delivery at 34+0 to 35+6 weeks in stable patients with suspected PAS [1]. The 2026 RCOG guideline recommends an individualised approach and, in the absence of antenatal

bleeding or risk factors for preterm birth, identifies 36+1 to 37+0 weeks as providing an appropriate balance [2]. The different windows reflect uncertainty in the evidence and differing assumptions about risk and emergency access. Each recommendation needs to be read in its clinical context.

The unresolved question is which women can safely continue pregnancy under clearly defined surveillance and emergency arrangements. Bleeding history, other obstetric indications, placental position and distance from definitive care should enter that discussion. A planned later birth in a well-supported, asymptomatic woman cannot be assumed to carry the same risk as waiting in someone with recurrent bleeding and a prolonged transfer journey.

Studies should define the intended strategy before outcomes occur and record emergency deliveries arising before the scheduled date. Analysing only women who successfully reach later gestation can create a misleading appearance of safety. Maternal outcomes must be considered alongside neonatal consequences and the woman's experience of prolonged uncertainty. Prospective comparisons with clear eligibility criteria are needed to identify which timing strategy best suits each clinical situation.

Surgery matched to anatomy and preference

Caesarean hysterectomy remains an important definitive treatment, particularly when disease extent or clinical instability makes preservation unsafe. The procedure should be planned around the extent and location of disease. At the same time, treatment choice should acknowledge that some women place substantial value on retaining their uterus, while others prefer definitive treatment over prolonged surveillance. Neither preference removes the obligation to explain uncertainty and the possibility that the operative plan may change.

Treatment terminology should be precise. Expectant management usually means leaving the placenta *in situ* and monitoring its subsequent course. Local resection removes affected uteroplacental tissue followed by reconstruction. These approaches have different mechanisms, follow-up requirements and failure patterns. Combining them under conservative management can obscure clinically meaningful differences.

The PACCRETA prospective study found that leaving the placenta *in situ* was associated with less major transfusion and several other severe outcomes than caesarean hysterectomy, after adjustment, but with more endometritis, embolisation and readmission [13]. Allocation was not random, so selection and residual confounding remain important. The study supports an informed discussion of alternatives; it does not show that expectant management is superior for every anatomical presentation or service.

A multicentre feasibility randomised trial assigned 60 women to hysterectomy or one-step conservative surgery [14]. Its principal contribution is demonstrating that randomised comparison is possible. Similar observed outcomes in a small feasibility trial do not establish equivalence, and subgroup findings cannot settle selection criteria. Definitive studies should report crossovers, intraoperative exclusions and the experience of participating surgeons as carefully as the successful reconstructions.

Long-term follow-up is needed to understand what uterine preservation achieves. In a prospective series of 19 women treated with one-step surgery, Kolak and colleagues reported one subsequent hysterectomy and uterine niches in half of the 18 women assessed with the uterus retained [15]. Such a small study cannot determine future fertility or pregnancy safety. It shows why anatomical preservation at discharge must be followed by assessment of symptoms, scar integrity and reproductive outcomes.

The intended treatment, reasons for any intraoperative change and eventual outcome should be recorded. Hysterectomy after an attempted preservation should remain within the preservation strategy's results. Similarly, a planned hysterectomy should not be

presented as a treatment failure merely because the uterus was removed. Quality depends on whether the decision was appropriate, informed and safely executed.

Expectant care requires an agreed contact route, defined review arrangements and access to urgent assessment for bleeding or infection. The woman's ability to attend follow-up is part of treatment feasibility. A strategy requiring repeated specialist attendance may be inaccessible without transport, accommodation or financial support. These are modifiable service barriers and should be addressed before apparent patient preference is interpreted as freely available choice.

Vascular and urological adjuncts

Prophylactic arterial occlusion illustrates the difficulty of evaluating an appealing technical intervention. Salim and colleagues randomised 27 women with suspected accreta and found no significant reduction in red-cell transfusion with prophylactic balloon catheters [16]. A subsequent trial by Chen and colleagues randomised 100 women with praevia and suspected accreta; internal iliac balloon occlusion did not reduce transfusion and increased costs and postoperative fever [17]. Neither trial proves that every vascular intervention is ineffective in every subgroup.

Internal iliac occlusion, aortic occlusion, embolisation and rescue procedures must be evaluated separately. Their anatomical effects and risks differ. Future trials should specify device position, timing, intended operation, rescue access and vascular complications, rather than treating interventional radiology as a single exposure. Any reduction in blood loss must be considered alongside arterial injury, thrombosis, ischaemia and procedural delay.

Ureteric stenting has a similar evidential problem. A recent retrospective cohort reported an association between temporary stents and fewer urinary injuries, while acknowledging selection bias and limited events [18]. This cannot establish universal benefit. Research should distinguish planned bladder resection from unintended injury and account for disease extent, surgeon experience and changes in practice over time.

Figure 1 summarises the transfusion findings from the two balloon trials. These adjuncts should be selected for a defined clinical purpose. An adjunct should solve an identified problem in the planned procedure, with expertise available to manage its complications. Routine use because a procedure is familiar can obscure who benefits and divert resources from other needs.

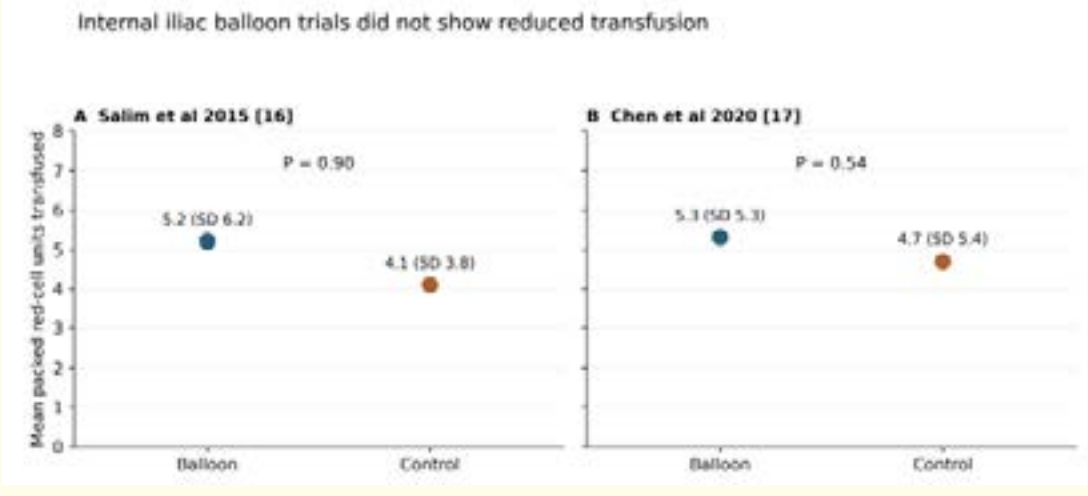


Figure 1: *Mean red-cell transfusion in two randomised trials of prophylactic internal iliac balloon catheters. Points show group means; values in parentheses in the panels are standard deviations, not confidence intervals. Salim., et al. [16]: 13 intervention and 14 control patients; Chen., et al. [17]: 50 patients per group. Neither trial demonstrated a statistically significant reduction. Panels are separate studies and are not pooled. Original plots prepared from published summary data.*

Haemorrhage readiness and perioperative recovery

Perioperative arrangements must remain reliable during sudden deterioration. Before surgery, the team needs a shared understanding of anticipated blood loss, transfusion access, vascular access and escalation arrangements. Anaesthetic planning should include the woman's preferences and the possibility of conversion or postoperative critical care. The current RCOG update recognises the role of cell salvage and greater patient involvement in these decisions [2].

We recommend a short preoperative briefing that identifies who will lead if bleeding accelerates and who will communicate with the family. A rehearsal should test the actual arrival of blood products and specialist assistance. A written protocol does not show whether the response works in practice. A useful audit would examine delays and their causes, including communication failures that are usually absent from operation notes.

Blood conservation should begin before delivery through assessment and treatment of anaemia under local protocols. During major bleeding, resuscitation and haemostatic management must respond to the patient's condition and available laboratory or point-of-care information. No single technology replaces an experienced team able to recognise deterioration and coordinate action. Introducing new monitoring should include training, interpretation standards and review of whether it changes management appropriately.

Recovery planning should start before admission. Women need realistic information about pain, mobility, wound care, neonatal separation and practical support after discharge. These discussions should be revisited after birth, when the woman knows what happened and what her recovery involves. Consistency of explanation matters: conflicting accounts from different teams can prolong uncertainty even when the clinical outcome is favourable.

Molecular diagnosis and treatment

Molecular studies raise the prospect of blood-based risk assessment and biological phenotyping [6,7]. However, a signal identified in placental or myometrial tissue obtained at delivery is not automatically measurable or informative earlier in pregnancy. Candidate biomarkers require testing in prospectively collected antenatal samples, with gestational age, placental location and alternative causes of abnormal results considered explicitly.

The first clinical question should be whether a biomarker adds useful information beyond history and expert imaging. A statistically different concentration between groups is not enough. Investigators should specify the decision the test is intended to change and measure how often it changes that decision correctly. Expensive assays would also need evaluation against simpler improvements in referral and ultrasound access.

Targeted treatment remains a research prospect. Associations involving angiogenesis, immune regulation or cell signalling do not establish that suppressing those pathways will safely reverse established attachment. Maternal benefit would have to be balanced against placental function, fetal exposure and the possibility of precipitating bleeding. Preclinical work must address these consequences before antenatal efficacy trials are justified.

Current RCOG guidance advises against methotrexate when the placenta is left *in situ* [2]. Any future therapeutic programme will need a plausible mechanism, a defined treatment window and explicit stopping rules. The goal should be improved maternal and neonatal outcomes, rather than a favourable laboratory response disconnected from clinical safety.

Recovery as a primary outcome

Psychological harm deserves direct measurement. In a small cross-sectional study of women with histologically confirmed PAS treated by hysterectomy, four of 11 respondents had questionnaire scores indicating high risk of post-traumatic stress disorder [19]. The sample

cannot provide a reliable population prevalence, and a screening score is not a clinical diagnosis. It does, however, identify distress that would be missed by reviewing transfusion and surgical records alone.

Follow-up should allow women to describe symptoms that may not emerge during a routine wound review. These include intrusive memories, anxiety about another pregnancy, sexual difficulties, fatigue and distress associated with loss of fertility. Assessment should avoid presuming that every woman experiences hysterectomy identically. Some may feel relief after definitive treatment; others may need prolonged support.

We propose a recovery review extending beyond the conventional early postpartum period, adapted to clinical need and local resources. It should connect obstetric and surgical follow-up with primary care, mental health support and reproductive counselling. Women retaining their uterus need an individual discussion before another pregnancy, including review of the previous operative record. Responsibility for coordinating this care should be assigned before discharge.

Research should ask survivors which outcomes matter most and how these change over time. Return to ordinary activity, confidence in future care and ability to care for the infant may be more meaningful than a small reduction in length of stay. Patient-reported outcomes should accompany clinical endpoints rather than be confined to optional substudies with substantial missing follow-up.

A framework for the next generation of care

We propose a practical framework combining diagnostic confidence, anticipated anatomical complexity, the woman's priorities and institutional readiness. Table 1 summarises emerging strategies and their evidence requirements; Table 2 sets out the corresponding multidisciplinary questions. These domains should be recorded at multidisciplinary review and revisited when symptoms or imaging change. The framework is intended to clarify the reasons for recommending hysterectomy, preservation or continued pregnancy; it is not a numerical score.

Development	Current position	Required next step
AI-assisted ultrasound	Promising retrospective discrimination in a small test cohort [11].	Prospective external validation followed by evaluation of referral decisions, missed cases and clinical outcomes.
One-step uterine reconstruction	A small randomised feasibility trial supports further study [14].	Adequately powered comparisons with prespecified anatomical eligibility, crossover reporting and long-term follow-up.
Placenta left *in situ*	Prospective observational evidence suggests a different balance of immediate and delayed morbidity [13].	Comparable treatment groups, standard surveillance and outcomes extending to readmission, infection and later surgery.
Vascular adjuncts	Internal iliac balloon trials have not demonstrated reduced transfusion [16,17].	Device-specific trials, anatomical stratification and complete ascertainment of vascular harm and costs.
Molecular phenotyping	Tissue studies provide mechanistic hypotheses [6,7].	Replication in antenatal samples and proof of added clinical value before treatment-directed use.
Structured survivorship care	Small studies identify psychological distress after treatment [19].	Patient-designed recovery measures and evaluation of accessible coordinated follow-up.

Table 1: *Future developments and the evidence needed.*

PAS: Placenta Accreta Spectrum. The proposed implementation criteria are conceptual recommendations, not validated thresholds.

Domain	Question for the team	Documented output
Diagnostic confidence	How likely is PAS, and what remains unresolved?	Imaging interpretation linked to clinical history; uncertainty and the need for additional review made explicit.
Anatomical complexity	Which structures and vascular territories may complicate treatment?	Operative map, required surgical expertise and the findings that could change the intended procedure.
Clinical trajectory	Is continued pregnancy compatible with the current symptoms and emergency arrangements?	Individual timing rationale, review triggers and an alternative for unscheduled presentation.
Patient priorities	What matters to this woman about definitive treatment, preservation and recovery?	A recorded discussion of feasible options, their burdens and the possibility of intraoperative change.
Institutional readiness	Can the proposed plan and its foreseeable complications be managed here?	Named lead, blood and theatre arrangements, specialist availability, transfer or escalation plan.
Recovery	Who will identify and respond to complications after discharge?	Assigned follow-up responsibility covering physical recovery, psychological needs and reproductive counselling.

Table 2: *A proposed framework for multidisciplinary decisions.*

PAS: Placenta Accreta Spectrum. The proposed implementation criteria are conceptual recommendations, not validated thresholds.

The framework should produce a clear intended pathway, an explanation of acceptable alternatives and a contingency plan. A woman with strong preferences for preservation may still need definitive surgery if the operative findings make reconstruction unsafe. Conversely, diagnostic uncertainty should prompt appropriate preparation without converting suspicion into an irrevocable decision. Communicating those distinctions is an essential clinical task.

Implementation should be audited against the full population served. Relevant measures include antenatal recognition, time to specialist review, emergency transfer, unplanned placental disruption, major transfusion, organ injury, readmission and recovery. Diagnostic false positives also matter because unnecessary escalation can lead to anxiety, travel and potentially avoidable intervention. Audit should be used for learning, with adjustment for case complexity and emergency presentation.

The proposed framework requires prospective evaluation. Services could introduce structured multidisciplinary documentation and compare decision quality, delays and outcomes with their previous pathway, while accounting for concurrent changes. Evidence that a framework is easy to complete would establish feasibility only. Demonstrating clinical value requires a stronger evaluation.

Accreta spectrum centres and the lessons from endometriosis services

Specialist PAS centres are already an established concept. Silver and colleagues described the capabilities of an accreta centre of excellence in 2015 [20]. The unresolved issue is how to make those capabilities consistently available, assess their performance and connect them to the population they serve. Designation should make a practical difference when a woman needs advice, transfer or emergency treatment.

Endometriosis services offer a relevant organisational comparison. NICE places specialist endometriosis centres within managed clinical networks and specifies access to advanced gynaecological surgery, colorectal and urological expertise, specialist nursing, imaging,

pain and fertility services [21]. BSGE accreditation adds an explicit framework for team structure, workload and outcome reporting, with revised criteria taking effect in 2026 [22]. These arrangements demonstrate how expertise can be made visible and subject to review. They do not establish that the same accreditation model will improve PAS outcomes.

The useful lesson is how a service takes responsibility for complex pelvic disease. Both services benefit from anatomical assessment before surgery, named specialist support and continuity after treatment. PAS additionally requires an obstetric emergency response, immediate blood provision and simultaneous maternal and neonatal care. Its care cannot depend on an elective operating list or the availability of a visiting surgeon. Conversely, endometriosis pathways address a chronic condition with different treatment timescales. Shared principles of coordination and review can be adapted to PAS, while staffing and workload requirements need their own evidence.

We propose that an Accreta Spectrum Centre should be a defined service within a hospital and regional network, with a clinical lead, specialist midwifery or nursing coordination, imaging review, experienced pelvic surgery and obstetric anaesthesia. It should have reliable transfusion, critical care and neonatal support, with urological or other surgical input matched to anticipated complexity. Interventional radiology should be available when clinically indicated and feasible; possession of every advanced device should not become a substitute for dependable core care.

Designation should require evidence of actual capability, including a tested emergency plan, arrangements during leave or sickness, and the ability to accept urgent referrals. The service should maintain prospective records linking intended treatment to anatomy, operative findings, complications and recovery. External review could examine difficult cases, missed diagnoses and failed transfers. Case volume is relevant to maintaining experience, but a universal minimum cannot be borrowed from endometriosis accreditation or inferred from a single economic model.

Table 3 sets out the proposed translation from endometriosis services to PAS care. Clinical evidence supports evaluating specialist centres, although the magnitude of benefit remains uncertain. A California population-based study identified 17 accreta centres among 25 high-volume hospitals. Among 788 PAS deliveries at those hospitals, the adjusted odds of a modified severe morbidity outcome were higher in non-centres, but the confidence interval included no difference (odds ratio 2.09, 95% confidence interval 0.91-4.80) [23]. This supports further evaluation, not a claim that designation itself has proven benefit. Figure 2 presents the observed rates and adjusted association. Referral of more complex cases, diagnostic coding and differences in local practice complicate comparisons.

Service principle	Application to PAS	Clinical and financial implications
Managed clinical network	Connect local recognition, regional capability and complex-care centres.	Fund transport and coordination; retain emergency competence outside the hub.
Named multidisciplinary team	Provide imaging, pelvic surgery, obstetric anaesthesia, specialist nursing and midwifery, transfusion, neonatal and critical care support.	Pay for readiness and leave cover; share infrastructure where feasible.
Accreditation and experience	Review capability, case mix, supervision, adverse events and resilience.	Avoid imported volume thresholds; account for review and training costs.
Patient involvement	Discuss feasible choices, uncertainty, relocation and recovery.	Include travel, accommodation, lost income and caregiving; avoid cost shifting.
Prospective outcome reporting	Track diagnosis, intended strategy, complications, readmission and recovery.	Support data linkage; compare complete episodes rather than procedure costs.
Geographic accountability	Assess the full catchment, including missed diagnoses and incomplete referrals.	Monitor transfer time and unequal access; prevent new barriers from centralisation.

Table 3: *Translating the endometriosis centre model into PAS care.*

PAS: Placenta Accreta Spectrum. The proposed implementation criteria are conceptual recommendations, not validated thresholds.

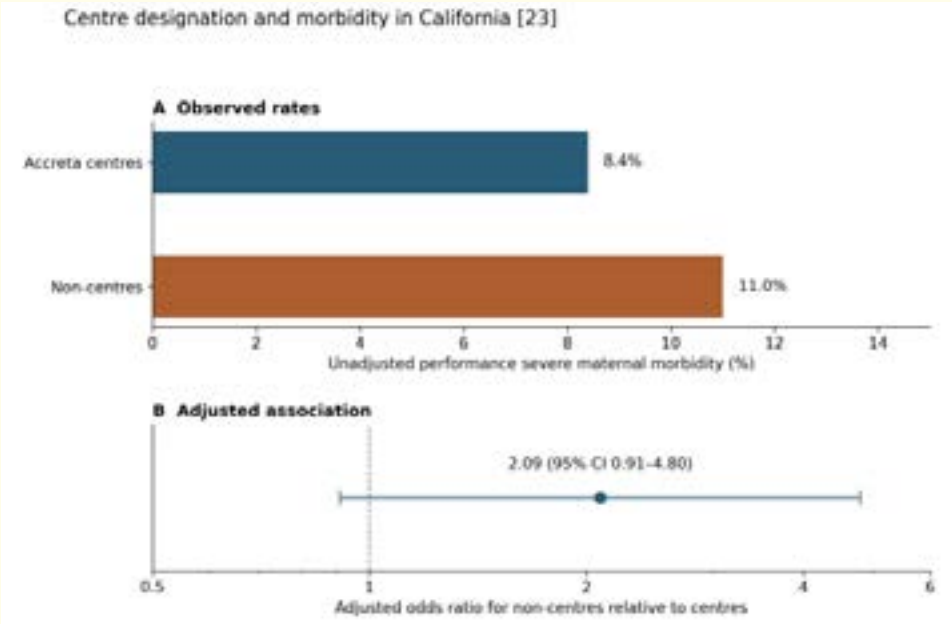


Figure 2: *Accreta centre evidence from a California observational study [23]. Panel A shows unadjusted rates of performance severe maternal morbidity, a modified outcome excluding hysterectomy, among 788 PAS deliveries at 25 high-volume hospitals. Panel B shows the adjusted odds ratio for non-centres relative to centres and its 95% confidence interval. The interval includes 1; the association was not statistically significant. The figure does not establish a causal effect of centre designation. Original plots prepared from published summary data.*

Centres may enable earlier decisions, more consistent preparation and quicker access to specialist help. They can also become congested, draw capacity away from other complex obstetric care or depend too heavily on a few surgeons. Accreditation needs scrutiny of outcomes and access if it is to signify more than institutional reputation. A credible centre should therefore accept responsibility for strengthening its referring services, rather than measuring success solely by the cases delivered within its walls.

Geography as a denominator of care

Geography affects which treatments are realistically available. The GPASS international survey examined geographic variation in PAS management, providing an empirical basis for questioning the universality of a single pathway [24]. However, an expert survey cannot describe the experience of every hospital or woman in a participating country. National income and continent tell us relatively little about the care available to an individual woman: a well-supported metropolitan team and an isolated district hospital may operate within the same health system.

By geography as a denominator of care, we mean responsibility for a defined population. A regional service should be assessed against all women with PAS in its catchment, as far as ascertainment permits, including those diagnosed at birth, treated elsewhere or unable to complete referral. Reporting only the outcomes of women who reach a specialist centre excludes those who could not obtain access and may conceal preventable harm elsewhere. Population-based surveillance should link birth, surgical, transfer and maternal outcome records, while acknowledging incomplete diagnosis and losses to follow-up.

Useful geographic measures include time from recognition to specialist advice, actual door-to-door transfer time, access to blood and the proportion of women receiving planned specialist delivery. Distance in kilometres is insufficient. Road conditions, seasonal disruption, ambulance availability, border procedures and the need to obtain payment may change the practical meaning of the same distance. These variables should inform network design and risk adjustment; they should not be used to excuse remediable differences in care.

A worldwide approach needs to consider how services function locally. In densely populated areas of Europe, East Asia or the Americas, several hospitals may be close enough to pool expertise, but fragmented referrals or competing providers can still obstruct coordination. In geographically compact Gulf systems, a national referral pathway may be feasible; language, entitlement, continuity of records and practical access still require assessment. These examples illustrate planning considerations; they are not comparative assessments of particular countries.

Across large territories, including rural areas of Africa, South Asia, Latin America and high-income countries, concentrating all treatment in a distant capital may increase the interval to definitive care. Island communities and sparsely populated regions face different transport constraints. Earlier planned relocation may help selected women, but it also separates families and creates accommodation costs. A network should specify when relocation is appropriate and how it will be supported, rather than leaving the burden to the woman.

The literature addressing PAS in low- and middle-income settings emphasises matching treatment to the patient's condition, team expertise and available resources [25]. Our proposed response is a tiered network: local services identify risk and stabilise emergencies; regional hospitals provide defined surgical and transfusion capability; designated referral centres manage the most complex planned cases and support the network. The boundaries require local agreement. Each tier should undertake only those procedures for which it has demonstrated competence and adequate support.

Telemedicine can assist image review, multidisciplinary discussion and postoperative follow-up. It cannot provide blood, anaesthesia or physical rescue. Visiting mentorship may build local expertise, but a visiting operating team without continuing emergency cover does not constitute a complete PAS service. Cross-border referral may have a role in small systems, provided transport, funding, records and postoperative responsibility are settled before clinical deterioration.

For an unstable woman, transfer may be harmful if it delays necessary resuscitation or surgery. The network must support immediate senior assessment of whether transfer is safe and what can be achieved locally. It must provide access to expertise while maintaining emergency capability throughout the region. Centralisation succeeds when it makes definitive care more reachable, rather than simply moving recorded activity to a preferred institution.

Clinical value and the financial case for centres

The financial question extends beyond the cost of the operation. Establishing a centre requires protected coordination time, training, simulation, data collection and reliable specialist cover. Shared imaging, theatres, critical care and blood-bank infrastructure may reduce the need for separate capital investment, but this capacity has an opportunity cost. Time reserved for PAS may affect cancer surgery, other maternity emergencies or elective gynaecology. The business case should account for these effects on other services.

A recent US decision-analytic model by Luu and colleagues compared multidisciplinary care with standard care in a hypothetical annual cohort of 5,000 women with PAS [26]. Under its baseline assumptions, including 15 PAS cases per centre annually, multidisciplinary care was both less costly and more effective. Sensitivity analysis suggested cost-effectiveness at seven or more cases annually. These are model-dependent estimates, not observed savings or validated accreditation thresholds. Staffing costs, complication probabilities and the valuation of health gains limit direct transfer to other countries.

Cost-effectiveness and affordability are distinct. A service may offer good value over time while requiring expenditure that a hospital cannot meet from its current budget. Conversely, lower hospital expenditure may reflect costs shifted to families through travel, lost earnings or unpaid caregiving. Commissioners should examine the hospital, health-system and household perspectives separately, then identify who pays and who benefits. A projected reduction in intensive care use is not automatically a cash saving if staffing and beds remain necessary for other patients.

We propose a funding arrangement that combines support for readiness with payment for clinical activity adjusted for complexity. Funding only completed operations can leave consultation, training, urgent advice and surveillance unsupported. Payment based solely on referrals or procedures may encourage unnecessary intervention. Contracts should include network responsibilities, access to emergency assessment and follow-up after uterus-preserving treatment, alongside safeguards against excluding women whose care is expensive or uncertain.

A regional assessment should compare feasible alternatives: improving coordination within existing hospitals, adding a designated regional service, or creating a larger referral hub with funded transport and accommodation. Costing should include the additional expenditure on establishment, staffing, transfers, neonatal care, readmissions and recovery support. The analysis should test different case volumes, travel times and complication rates. Imported prices converted into local currency cannot substitute for local resource costing.

Financial evaluation should accompany clinical audit from the outset. Measures could include cost per complete episode of care, major complications, readmissions, referral completion and financial hardship reported by families. Savings must not depend on discharging women prematurely or restricting access to definitive treatment. Where the main obstacles are blood availability, transport or safe anaesthesia, investment in those foundations may provide more immediate value than a separate building or expensive adjunctive technology.

A centre should therefore have funded responsibilities to its region and be able to demonstrate the capabilities it offers. Its physical form may differ between health systems. The essential test is whether it reduces avoidable harm without making specialist care financially or geographically inaccessible.

Fertility expectations and the limits of uterine preservation in the Middle East

For some women, the prospect of hysterectomy threatens much more than the ability to carry another pregnancy. It may unsettle their sense of identity, their hopes for a large family or their confidence in the future of a marriage. These concerns deserve particular attention in Middle Eastern services, where clinicians may encounter strong expectations about childbearing and family continuity. They should be explored with each woman, rather than inferred from her nationality, religion or number of children. A wish for a large family may be deeply personal, influenced by relatives, or both.

Evidence from the region illustrates this complexity. A Saudi Arabian survey of 404 women being assessed for uterovaginal prolapse found varied attitudes towards hysterectomy and varied preferences for who should make the decision. Partners and female relatives were among the sources of advice women consulted [27]. In a Jordanian cross-sectional study of 251 women after hysterectomy, wanting more children was associated with greater anxiety and stress [28]. A separate qualitative study of 35 Jordanian women described disruption of identity, strain in marital relationships and efforts to rebuild meaning after surgery [29]. These studies concern predominantly non-obstetric care and cannot establish how frequently women with PAS refuse hysterectomy, or describe the whole Middle East. They do show why a technically accurate explanation of surgery may leave important fears unanswered.

The same concerns are not confined to the region. Qualitative interviews with women treated for PAS in Utah identified grief over lost fertility, uncertainty and a sense of limited control over decisions [30]. What varies is the meaning of that loss within a woman's life and the support available afterwards. Where further childbearing is expected, a woman who already has several children may still experience hysterectomy as the abrupt loss of an unfinished reproductive future. Parity alone does not establish that her family is complete. Equally, a clinician should not assume that a woman wants further pregnancies because her relatives do.

Preoperative counselling should therefore ask what preserving the uterus means to the woman and what she fears about losing it. Concerns about femininity, sexual relationships, abandonment or pressure to have more children should be heard without endorsing the belief that a woman's worth depends on fertility. The discussion should distinguish retaining the uterus from the uncertain prospect of another safe pregnancy. Religious or spiritual concerns can be explored with support chosen by the woman; clinicians should not present cultural expectations as religious requirements.

Family involvement can provide reassurance and practical support, particularly when the woman wishes decisions to be discussed collectively. It can also make disagreement difficult to express. We recommend offering a private conversation and a professional interpreter when needed, with explicit permission before involving relatives. This allows the team to establish whether a request to preserve the uterus reflects her own priorities. Fear of stigma or violence calls for confidential support and safeguarding assessment, not a promise that surgery can always preserve fertility.

The surgeon's ethical dilemma when preservation becomes unsafe

The operating surgeon may face two distressing possibilities: removing a uterus that the woman strongly wishes to retain, or continuing an attempt at preservation while haemorrhage and physiological instability worsen. The ethical task is to judge whether preservation remains a reasonable treatment for this woman in these circumstances. It is not resolved by treating either hysterectomy or conservation as an automatic measure of success. A necessary hysterectomy can be good care and still cause profound grief.

A promise to preserve the uterus at all costs is unsafe because neither imaging nor operative expertise can guarantee that result. Before surgery, the team should discuss the intended approach, the reasons it might need to change and the limits of local capability. Where the woman agrees to hysterectomy as a contingency, that agreement should be recorded clearly. Relevant reasons to reconsider preservation include bleeding that cannot be controlled, worsening instability, coagulopathy, or anatomy that prevents safe reconstruction. These are prompts for clinical judgement rather than validated numerical stopping rules. Seeking another experienced opinion is valuable when time permits, but should not delay necessary haemorrhage control.

Respect for autonomy also places limits on what can be done in the name of safety. A strong request for preservation is not necessarily an absolute refusal of hysterectomy; the distinction must be clarified. Conversely, refusal must not be dismissed as a failure to understand simply because the surgeon disagrees. ACOG's ethics guidance affirms the decision-making authority of a pregnant patient with capacity, including refusal of treatment needed to sustain life, and rejects coercion [31]. Counselling should explain foreseeable consequences, check understanding and voluntariness, and offer further discussion or ethics consultation where time allows. Respecting refusal does not require a surgeon to offer an operation judged clinically inappropriate. Disagreement should prompt timely review and, where feasible, referral without abandonment of care.

Emergencies require a separate assessment of authority to act. If the woman lacks capacity and immediate treatment is necessary, the team must consider her known wishes, the scope of prior consent and applicable local law. GMC guidance permits immediately necessary treatment when a patient lacks capacity and her wishes cannot be established; it also requires an explanation afterwards when she has recovered sufficiently [32]. This is a UK professional framework, not a statement of law throughout the Middle East. A known refusal

cannot simply be erased by anaesthesia or deterioration. Hospitals need locally reviewed policies for these cases; a relative's request is not, by itself, authority to override a woman who has capacity.

The surgeon may also feel pressure from the family, fear of complaints, institutional expectations or a personal commitment to successful reconstruction. We propose that teams discuss these pressures explicitly during planning and debriefing. Continuing because substantial effort has already been invested in preservation can allow the original goal to displace reassessment of the woman's condition. Documentation should explain the clinical findings, options considered, advice sought and reasons for changing course. It should support honest review rather than retrospectively justify every decision.

Accreta Spectrum Centres should make this ethical work part of routine care. Alongside surgical expertise, they need access to interpreters, psychological support, social work and timely ethics advice. Women who undergo hysterectomy should be offered a clear account of what happened, space to grieve and follow-up addressing physical, sexual and emotional concerns. Cultural sensitivity means taking reproductive loss seriously while protecting the woman's voice. It cannot mean leaving a surgeon to pursue preservation beyond defensible clinical limits or treating survival as the end of her care.

Clinical situation	Ethical concern	Suggested response
Wish for a large family	A reproductive goal may be personal, shaped by family expectations, or both.	Ask privately about the woman's priorities; avoid inferring wishes from parity or cultural background.
Family demands preservation	Relatives may provide support or create pressure.	Include them with permission; preserve confidential access to the woman and clarify who has authority to decide.
Request to avoid hysterectomy	A preference for preservation may differ from an absolute refusal.	Clarify the distinction, explain risks and feasible options, and record the scope of consent.
Preservation becomes unsafe	Continued surgery may increase haemorrhage, injury or physiological deterioration.	Reassess anatomy and physiology with the team; consider agreed contingencies without avoidable delay.
Informed refusal with capacity	Clinical recommendations and the woman's decision may conflict.	Avoid coercion; check understanding and voluntariness; seek timely ethics and locally appropriate legal advice.
Emergency loss of capacity	The authority to intervene depends on prior wishes and applicable law.	Review known preferences and prior consent; use local emergency policy and document the basis for action.
Hysterectomy after attempted preservation	Survival may coexist with grief, mistrust or moral distress.	Explain the decision honestly; offer psychological and social support, follow-up and team debriefing.

Table 4: *Ethical tensions in requests for uterine preservation.*

PAS: Placenta Accreta Spectrum. The proposed implementation criteria are conceptual recommendations, not validated thresholds.

Research priorities and equitable progress

Research first needs consistent definitions of PAS and its anatomical severity. Without consistent denominators, apparently impressive improvements may reflect changes in coding or inclusion of less severe cases. Imaging, operative findings and pathology should be linked

wherever possible, while acknowledging that histology is often unavailable after preservation. Diagnostic uncertainty must remain visible in the dataset [5,8].

Comparative studies should define treatment strategies from the point of decision and follow women beyond discharge. Randomised trials are feasible for some questions, as the surgical feasibility trial demonstrates [14]. Where randomisation is impractical, prospective registries should capture intended treatment, anatomy, surgeon experience and crossover. Analyses must avoid assigning the most difficult cases to one treatment and then attributing their outcomes entirely to that treatment.

Training programmes also need evaluation. New operations require supervision, transparent reporting of the learning curve and assessment of the whole team's performance. A technique developed by a small expert group may not retain its results after wider adoption. Dissemination should therefore include structured mentorship and prospective monitoring, rather than relying only on operative videos or short workshops.

Conclusion

Progress in PAS management will depend on translating biological insight and technical advances into dependable clinical care. Earlier recognition, anatomically informed planning and carefully evaluated treatment choice offer credible routes to improvement. Artificial intelligence and molecular approaches remain promising, but their value must be demonstrated through better decisions and safer outcomes. Uterine preservation deserves rigorous study, informed by the woman's own reproductive priorities and a clear understanding of clinical limits. Sociocultural concerns about hysterectomy require sensitive counselling; attempts at preservation must be reconciled with consent, the duty to avoid harm and timely haemorrhage control. Accreta Spectrum Centres offer a credible organisational direction if they strengthen surrounding services, fund readiness and address the costs of access. Their performance should be measured across their geographic catchment, including women who do not reach the centre. Clinical excellence becomes meaningful when women can obtain it and remain supported throughout recovery.

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Competing Interests

None declared.

Ethics

This article presents a narrative review and conceptual service proposal. It reports no original participant-level research; ethical approval and participant consent were not required.

Data Availability

No original dataset was generated or analysed.

Author Contributions

O Amu: conception and literature review. M O Thompson, F A Sanusi, V N Chilaka and H Saleh: literature and manuscript review.

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